DOCUMENT RESUME

ED 283 568 JC 870 309

AUTHOR Spahr, Anthony E.
TITLE The Relationship between Grades Earned in Introductory Nursing Courses and Several Predictor Variables: An Exploratory Study.
INSTITUTION Morton Coll., Cicero, Ill.
PUB DATE 87
NOTE 9p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; *Achievement Tests; Basic Skills; Community Colleges; Educational Testing; *Grades (Scholastic); Introductory Courses; *Nursing Education; *Predictor Variables; Student Evaluation; Two Year Colleges; *Two Year College Students
IDENTIFIERS Nelson Denny Reading Tests

ABSTRACT

A study was conducted at Morton College (Illinois) to gain a better understanding of the factors which contribute to academic success in introductory nursing courses, and to investigate the relationship between the following variables: student grades in Fundamentals of Nursing I and II, Anatomy and Physiology I, and Rhetoric I; and their scores on the Nelson-Denny Reading Tests and on two in-house mathematics placement examinations. The course grades and test scores of the study sample of 47 first-year nursing students were slightly above average on most of the academic and achievement measures. Correlation and regression analyses suggested that success in introductory nursing courses was related to a student's ability to read, write, and understand fundamental concepts of anatomy and physiology. To a lesser extent, success was also correlated with ability to perform basic mathematical operations. Based on study findings, it was suggested that the college consider the establishment of comprehensive pre-admission assessment programs, review high school transcripts and other records of previous academic work more closely, and implement curricular changes, including remedial education, to insure that students develop needed basic competencies. (EJV)

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ED283568

The Relationship Between Grades Earned in Introductory Nursing Courses and Several Predictor Variables: An Exploratory Study

Anthony E. Spahr
Director, Institutional Services
Morton College
Cicero, Illinois

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The Relationship Between Grades Earned In Introductory Nursing Courses and Several Predictor Variables: An Exploratory Study

Nursing educators today seem particularly interested in collecting data about students enrolled in their programs. These data are frequently used to validate instructional methodologies, provide a rationale for course placement decisions, or fulfill accreditation requirements. In addition, they are occasionally used to gain a better understanding of the factors which contribute to academic success in the discipline. The study described here was conducted with the final purpose in mind.

Methodology

Forty-seven first-year nursing students enrolled at Morton College, a community college located in Cicero, Illinois, served as subjects in the present exploratory study which was designed to investigate the relationship between the following variables: the grades the students earned in Fundamentals of Nursing I (NUR 111), Fundamentals of Nursing II (NUR 112), Anatomy and Physiology I (BIO 103), and Rhetoric I (ENG 101), and their scores on the Nelson-Denny Reading Test (Vocabulary, Comprehension, and Total) and two in-house mathematics placement examinations.

NUR 111 provides students with an overview of common patient needs and provides them with a basic understanding of observation, communication, environmental protection, body elimination, personal hygiene, body integrity, nutrition, vital signs, bedmaking, and position.

NUR 112 builds on the concepts presented in NUR 111 and includes the administration of medications, therapeutic treatments, surgical

asepsis, psychosocial and spiritual needs of patients; and an introduction to the nursing process, grieving, and gerontology.

BIO 103 provides an overview of the structure and function of vertebrates, especially as they relate to the human body. Major topics include integumentary, skeletal, muscle, cardiovascular and reproductive systems; basic chemistry; cellular structure; genetics; and embryology.

ENG 101 gives students the opportunity to develop effective writing skills including the selection of appropriate words; construction of acceptable sentences and paragraphs; and organization of compositions based on a planning outline and thesis. Students are required to read various selections and to become acquainted with different styles of prose.

The Nelson-Denny Reading Test is frequently used to assess the reading ability of first-year college students and provides sub-scale scores indicating vocabulary and comprehension levels.

The mathematics placement examinations used in the present study are designed to measure a student's ability to perform basic mathematical operations (i.e., addition, subtraction, multiplication, and division) and metric conversions.

Multiple regression analyses were performed to identify those variables which were most closely associated with the grades earned by students in NUR 111 and NUR 112. Pearson product-moment correlations and other descriptive statistics were also calculated.

Results

Table 1 suggests that the sample was slightly above average on most of the academic and achievement measures included in the study. Results from the Nelson-Denny indicated a mean 13.45 grade reading level. Sub-

scale means for vocabulary and comprehension were at the 13.98 and 12.05 grade levels respectively.

The mean grade in ENG 101 was 2.76, nearly a B on the 4.00 grading scale used at the college. The mean grade in NUR 111 was 2.40, 2.47 in NUR 112, and 2.24 in BIO 103.

The mean score on the mathematics placement examination to assess ability to perform basic mathematical operations was 25.83 (highest possible score was 30), and 9.93 (highest possible score was 35) on the test to measure metric conversion skills.

Table 1. Means and Standard Deviations

Variable	Mean	Standard Deviation
	(Grade Level)	
Nelson-Denny		
Vocabulary (ND Voc)	13.98	1.49
Comprehension (ND Com)	12.05	2.37
Total (ND Tot)	13.45	1.55
	(4.00 Grading Scale)	
ENG 101	2.76	.89
NUR 111	2.40	.76
NUR 112	2.47	.77
BIO 103	2.24	1.13
	(Highest Possible Score 30)	
MAT I	25.83	5.81
	(Highest Possible Score 35)	
MAT II	9.93	3.79

An examination of Table 2, a summary of Pearson product-moment correlations, provides some insight into the factors which may be related to students' performance in introductory nursing courses. Grades earned in NUR 111 were correlated with ND Voc ($r = .663$, $p < .01$), ND Tot ($r = .539$, $p < .01$), ENG 101 ($r = .448$, $p < .01$), NUR 112 ($r = .430$, $p < .01$), and BIO 103 ($r = .438$, $p < .01$). NUR 112 grades were correlated with ND Com ($r = .326$, $p < .05$), ND Tot ($r = .401$, $p < .01$), ENG 101 ($r = .488$, $p < .01$), NUR 111 ($r = .430$, $p < .01$) and BIO 103 ($r = .426$, $p < .01$).

Table 2. Correlation Matrix

	ND Voc	ND Com	ND Tot	ENG 101	NUR 111	NUR 112	BIO 103	MAT I	MAT II
ND Voc	1.000								
ND Com	.251	1.000							
ND Tot	.819+	.694+	1.000						
ENG 101	.330*	-.035	.247	1.000					
NUR 111	.633+	.217	.539+	.448+	1.000				
NUR 112	.265	.326*	.401+	.488+	.430+	1.000			
BIO 103	.368*	.279	.436+	.282	.438+	.426+	1.000		
MAT I	.247	.325*	.301*	-.062	.227	.259	.094	1.000	
MAT II	.088	.068	.121	-.041	-.065	.107	-.106	.461+	1.000

* $p < .05$
\+ $p < .01$

The results of stepwise multiple regression analyses, shown in Tables 3 and 4, are similar to those summarized in Table 2. When NUR 111 was used as the criterion variable and all other variables, excluding NUR 112, were entered as predictors, ND Voc, ENG 101, and BIO 103 were identified as providing the most efficient solution. The stepwise solution to the multiple regression equation for NUR 112 yielded the following four predictors: ENG 101, ND Com, BIO 103, and MAT I, a factor not readily apparent from an examination of the correlation matrix.

Table 3. Multiple Regression Summary for NUR 111

Source	df	SS	MS
Regression	3	13.5133	4.5044
Residual	43	13.2665	.3085
Total	46	26.7798	

$F(3,43) = 14.600$ $p < .001$

Multiple Correlation = .7104

R Squared = .5046

Standard Error = .5620

Variable	Coefficient	T	S.E.	p
ND Voc	.249149	4.040	.0617	<.001
ENG 101	.201283	2.004	.1004	.0487
BIO 103	.124819	1.551	.0805	.1246
Constant	1.192865			

Table 4. Multiple Regression Summary for NUR 112

Source	df	SS	MS
Regression	4	11.9332	2.9833
Residual	42	15.2689	.3635
Total	42	27.2021	

$F(4,42) = 8.206$ $p < .001$

Multiple Correlation = .6623

R Squared = .4387

Standard Error = .6103

Variable	Coefficient	T	S.E.	p
ENG 101	.385320	3.617	.1065	.001
ND Com	.070201	1.678	.0418	.0971
BIO 103	.151484	1.734	.0874	.0867
MAT I	.025841	1.576	.0164	.1189
Constant	-.447858			

Discussion

The results of the present study clearly suggest that success in introductory nursing courses is related to a student's ability to read, write, and understand fundamental concepts of anatomy and physiology. To a lesser extent, success may also be related to one's ability to perform basic mathematical operations.

These findings are not surprising. Indeed, it would have been alarming to discover that successful first-year nursing students had not

mastered these essential skills. Nurses are required to read and comprehend materials ranging from journal articles to doctors' notes; to observe and record, often in minute detail, the activity and progress of patients; to calculate dosages; and to understand the structures and functions of the human body. If first-year nursing students do not have the skills needed to perform these tasks before admission, then it is essential that they develop them early in their program of study. This may require the establishment of comprehensive pre-admission assessment programs, closer review of high school transcripts and other records of previous academic work, and curricular changes, including remedial education, to insure that students develop these basic competencies.

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